CLAIMS

We claim:

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1. An AC-to-DC converter comprising:

a transformer having a primary side for inputting an input signal and a secondary side for outputting an output signal;

a synchronous rectifier controller connected only to circuits on said secondary side for controlling a synchronous rectifier (SR) switch on said secondary side for generating said output signal;

said SR switch comprising a MOSFET transistor having a gate connected to said synchronous rectifier controller;

said synchronous rectifier controller further comprising a plurality of circuit elements for turning off said SR switch before a main switch of said transformer is turned on and for turning on said SR switch when said main switch of said transformer is turned off;

said synchronous rectifier controller comprising a means for generating a dead-time for turning off said SR switch with a controlled dead-time before said main switch of said transformer is turned on;

said synchronous rectifier controller comprising a pulse differentiator for resetting and restarting a ramp generator at a time when a main switch driving said transformer on;

said dead-time means further comprising a voltage-ramping means initiated by an output from said pulse differentiator for generating an up-ramping voltage;

said dead-time means further comprising a dead-time comparator for comparing said up-ramping voltage with a voltage generated by a charge integrator for generating a dead-time signal for turning off an output current driver.

said charge integrator comprising a circuit having a fixed time-constant of charge-integration independent of an output load of said AC-to-DC converter;

said synchronous rectifier controller further comprising an output current detector for enabling a positive current source for providing a fixed positive current to charge said charge integrator; and

said synchronous rectifier controller further comprising a switch for turning on and off said positive current source depending on an output of a secondary winding of said transformer.

2. An AC-to-DC converter comprising:

a transformer having a primary side for inputting an input signal and a secondary side for outputting an output DC signal; and

a synchronous rectifier controller connected only to circuits on said secondary side for controlling a synchronous rectifier (SR) switch on said secondary side for generating said DC output signal.

3. The AC-to-DC converter of claim 2 wherein:

said SR switch comprising a MOSFET transistor having a gate connected to said synchronous rectifier controller.

4. The AC-to-DC converter of claim 2 wherein:

said synchronous rectifier controller further comprising a plurality of circuit elements for turning off said SR switch before a main switch driving said transformer on and for turning on said SR switch when said main switch of said transformer is turned off.

5. The AC-to-DC converter claim 4 wherein:

said synchronous rectifier controller comprising a means for generating a dead-time for turning off said SR switch with a controlled dead-time before said main switch of said transformer is turned on.

6. The AC-to-DC converter claim 5 wherein:

said synchronous rectifier controller comprising a pulse differentiator for resetting and restarting the voltage ramp generator at a time when a main switch driving said transformer on.

7. The AC-to-DC converter claim 6 wherein:

said dead-time means further comprising a voltage-ramping means initiated by an output from said pulse differentiator for generating an up-ramping voltage; and

said dead-time means further comprising a dead-time comparator for comparing said up-ramping voltage with a voltage generated by a charge integrator for generating a dead-time signal for turning off an output current driver.

8. The AC-to-DC converter claim 7 wherein:

said charge integrator comprising a circuit having a fixed time-constant of charge-integration independent of an output load of said AC-to-DC converter.

9. The AC-to-DC converter claim 7 wherein:

said synchronous rectifier controller further comprising a positive current detector for enabling a positive current source for providing a constant positive current to charge said charge integrator; and

said synchronous rectifier controller further comprising a positive current switch for turning on and off said positive current source depending on an output of a secondary winding of said transformer.

10. The AC-to-DC converter of claim 3 wherein:

said SR switch comprising a N-channel MOSFET transistor having a gate connected to said synchronous rectifier controller for turning off said MOSFET when a drain of said N-channel MOSFET transistor is driven high.

11. The AC-to-DC converter claim 2 wherein:

said synchronous rectifier controller comprising a voltage clamp waveform clipper connected to an output of a secondary winding of said transformer for providing a square waveform corresponding to said output of said secondary winding.

12. The AC-to-DC converter claim 2 wherein:

said synchronous rectifier controller further comprising a current threshold detector connected to an output of a secondary winding of said transformer for sensing and turning off said SR switch when a current said output of said secondary winding is reduced below a threshold voltage.

13. A synchronous rectifier controller for an AC-to-DC converter wherein:

said synchronous rectifier controller connected only to circuits on a secondary winding of a transformer of said AC-to-DC converter and responding to a voltage of secondary winding for controlling a synchronous rectifier (SR) switch on said secondary side for generating a DC output signal.

14. The synchronous rectifier controller of claim 13 wherein:

said SR switch comprising a MOSFET transistor having a gate connected to said synchronous rectifier controller.

15. The synchronous rectifier controller of claim 14 wherein:

said SR switch comprising a N-channel MOSFET transistor having a gate connected to said synchronous rectifier controller for turning off said MOSFET when a drain of said N-channel MOSFET transistor is driven high.